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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

AUG 19 1987

In Reply Refer to 3HW14:

Mr. Timothy Alexander
Project Manager
Bureau of Solid Waste Management
Pennsylvania Department of Environmental Resources
P.O. Box 2063
Harrisburg, PA 17120

Re: Paoli Natural Resource Damages

Dear Mr. Alexander:

As I had promised you, enclosed you will find NOAA's Paoli Railyard preliminary report recently provided to EPA. This is the version of the document available for public release. However, the complete report, which is classified, is available for your reveiw at the Region III office. You can arrange to see it by contacting Alyce Fritz of NOAA at (215) 597-3636.

Sincerely,

Bill Steuteville, Environmental Scientist
CERCLA Removal Enforcement Section

Enclosure

[redacted] w/ enclosure

AR100001

Coastal Hazardous Waste Site Review: Site Reports June 1987

Contributing Authors:

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Ocean Assessments Division
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Paoli Railyard
Paoli, Pennsylvania

SITE EXPOSURE POTENTIAL

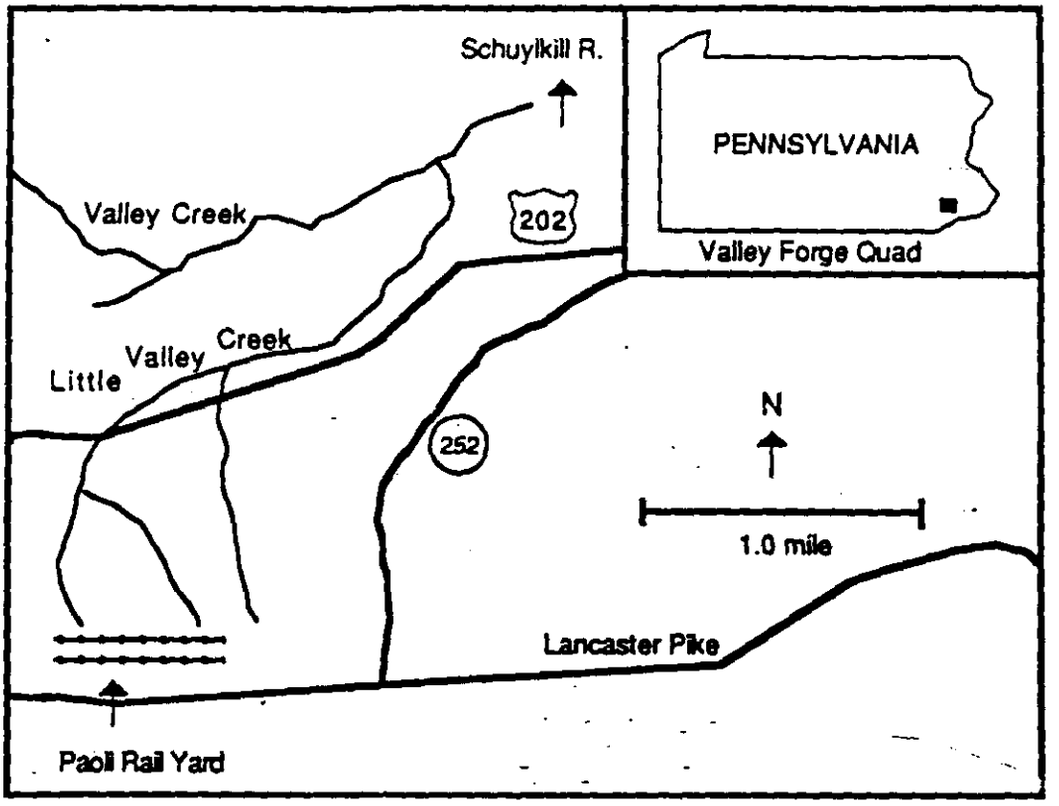
The Paoli Railyard, in Paoli, Chester County, Pennsylvania, is an active electric train repair facility and commuter rail station owned by AMTRAK and operated by the Southeastern Pennsylvania Transportation Authority (SEPTA). Commuter trains are serviced, repaired, and stored at this facility. Routine maintenance and repair of railroad cars involving polychlorinated biphenyl-containing electrical equipment was conducted in the facility's railyard. The site is bordered on three sides by residential communities and on the fourth side by commercial facilities. Until the spring of 1986, when SEPTA installed a security fence, the site was unsecured and easily accessible. Residents and commuters used the site regularly as a shortcut to reach both the train station and the commercial properties.[1]

The Paoli Railroad facility is located on approximately 4 hectares of rolling upland known as the South Valley Hills. These northeast-trending hills separate the Little Valley Creek watershed to the north from the Crum Creek watershed to the south. Major surface water runoff pathways flow north along the hollows towards unnamed tributaries to Little Valley Creek. These three unnamed, north-flowing tributaries emerge from culverts less than 366 meters downstream from the railyard. The confluence of these tributaries with Little Valley Creek is less than 1.6 kilometers north of the site. Little Valley Creek flows north to join with Valley Creek, which flows into the Schuylkill River approximately 4.8 kilometers downstream, in Valley Forge Park. The Paoli site is approximately 6.5 kilometers south of the Schuylkill. The Schuylkill, approximately 150 to 200 meters wide, flows into the Delaware 23 kilometers downstream.

CHEMICAL HAZARDS

Contaminants and Concentrations

PCBs (Aroclor 1254 and 1260) have been detected at high levels in soil samples taken at the Paoli railyard site. Inadequate containment is evidenced by high PCB concentrations detected in soil samples taken to depths of 1 meter below the ground surface. AMTRAK's June 1984 sampling survey indicated levels ranging up to 3.96% PCBs and averaging around 400 ppm. U.S. Environmental Protection Agency sampling at the site in 1985 indicated a range of approximately 0.5 to 2,642 ppm PCBs both on and off the facility. Sampling areas included a gulley leading to nearby residents' yards and the yards themselves. Analysis of sediment samples taken along the drainage pathways and stream sediments of the tributaries to Little Valley Creek has indicated a surface pathway of release (>50 ppm PCB) and significant contamination of sediments (up to 37 ppm). Biological uptake, a bioaccumulation pathway, has been documented in the receiving streams. PCBs have been found in brown trout at levels as high as 5 ppb from Valley Creek from 1980 to January 1986. This prompted a state ban on taking fish from this creek although nonconsumptive sport fishing (i.e., returning fish to the creek) is still permitted.



Extent of Contamination

Areas containing PCB concentrations greater than 50 ppm were noted throughout the Paoli site. These included the service pits in the shop, an inspection pit, and several areas where PCB-contaminated materials like crossties and drums were temporarily stored. PCBs were present in concentrations of several thousand ppm in areas near and between tracks and in service pits where spills may have occurred. Debris, spilled oil, and dirt are regularly swept or washed from the shop's floor areas and, as of 1981, placed in labelled drums for later disposal. Debris outside the shop normally works its way into the surface sediment due to weathering. Drainage from the floor and service pit areas flows into a cesspool and tile field on-site. A subsurface holding tank for waste lubricating oil and grease has recently been installed.

An unknown amount of transformer oil was spread in parking lots as a dust control measure. No liner or leachate collection system was used in the parking lot area. Commuters crossing the yard may have tracked PCBs off-site and into their homes every day. Erosion of PCB-containing sediment from the yard was quite severe in places. The discharge of rainfall, and storm runoff and erosion pathways are PCB sources for the neighborhood and Little Valley Creek watershed, particularly the unnamed tributaries on North Valley Road and Hollow Road.

Duration of Contaminant Release

PCBs have been released until 1986 through surface contact with workers and commuters. Off-site migration has occurred intermittently through erosion and surface water runoff during the entire period of operation.

TRUST HABITATS AND RESOURCES

Habitats and Resources at Risk

The lower reaches of Valley Creek and the Schuylkill River in the vicinity of Valley Forge Park historically supported anadromous fisheries. This area of the Schuylkill River is designated for restoration of shad and herring runs. The Pennsylvania Fish Commission conducts a hatchery program introducing juvenile American shad in portions of the Schuylkill between Reading and Philadelphia,[2] the same portion of the Schuylkill River potentially affected by the site. Portions of the Schuylkill between the site and the Delaware River are used as spawning and nursery grounds. It is also likely that catadromous eels use Valley Creek.[3] Table 1 presents a summary of anadromous and resident fish resources of the Schuylkill River.

Commercial and recreational fisheries exist on the stretch of the Schuylkill River between Philadelphia and Reading for both anadromous and resident fish species.

Table 1. Anadromous and Resident Fish species of the Schuylkill River[4]

Species	Adult Habitat	Spawning Area	Nursery Area	Commercial Fishery	Recreational Fishery	Migratory Route
Anadromous/Catadromous						
American shad						x
Atlantic sturgeon						x
American eel	x		x	x		x
hickory shad						
gizzard shad		x	x			
alewife		x	x	x	x	x
Resident						
white catfish		x		x		
brown bullhead		x		x		
white perch	x	x	x	x	x	x
striped bass		x		x		x
bluegill	x				x	
black crappie	x				x	
yellow perch					x	
pumpkinseed	x				x	

Contaminants in Habitats and Resources

The primary fate of PCBs in aquatic environments is adsorption on sediments or suspended particulate matter (SPM). With low aqueous solubility and a high octanol/water partitioning coefficient, PCBs have a strong affinity for absorption. PCBs are subject to volatilization, but this process is slower for the heavier PCBs, such as Arochlor 1254 and 1260, found at the site. The presence of organic matter also greatly reduces volatilization rates.

Bioaccumulation and biomagnification of PCBs in aquatic organisms is a significant problem. These compounds are highly lipophilic and concentrate in adipose tissue. Aroclor 1254 and 1260 are very persistent and essentially non-biodegradable.

The heavier PCBs can be photolyzed by ultraviolet light, though the process is exceedingly slow. Photolysis results in the replacement of chlorine by hydroxy through photochemical free-radical substitution, or alkali and photochemically catalyzed nucleophilic substitutions. Hydroxylation at the ortho position produces 2-hydroxychlorobiphenyl, oriented such that

chlorodibenzofuran (CDF) may be formed by oxygen binding to an ortho position on the other ring.[5] The presence of metals or metal salts tend to catalyze these reactions. These compounds are also persistent in aqueous environments.

Severe contamination of surface soils has occurred at the site. Table 2 lists the maximum concentrations of PCBs found at various portions of the site sampled in 1979.

Table 2. Maximum Concentrations (ppb) of PCBs Found On-Site

	Concentration	
Location	Aroclor 1254	Aroclor 1260
cesspool	2,070	2,660
entrance		1,100
storage area	2,700	10,700
runoff area near cesspool	600	2,400

Wells sampled near the site did not contain detectable PCBs levels. Surface water and sediment collected from tributaries of Little Valley and Crum Creeks indicate that contamination of these areas has occurred. Table 3 lists the maximum concentrations of PCBs found at various sampling points along these creeks.

Table 3. Maximum Concentrations (ppb) of PCBs Found in Off-Site Surface Water and Sediments

Location	Medium	Concentration
Crum Creek		
Tributary A	surface water	0.09
	sediment	530.0
Tributary B	surface water	—
	sediment	77
Little Valley Creek		
Valley Road	surface water	2.0
	sediment	2,700
Hollow Road #1	surface water	20.0
	sediment	35,000
Hollow Road #2	surface water	0.03
	sediment	33,000

Surface water concentrations of PCBs are in excess of the 0.014 ppb freshwater chronic water quality criteria value for all samples. The samples taken from a tributary of Little Valley Creek along Hollow Road #1 contained concentrations of PCBs far in excess of the 2 ppb criteria level for acute exposure.[6] Samples collected in a tributary near Cedar Hollow Road did not detect PCBs. Sediment PCB concentrations in Little Valley Creek are extremely high. In two samples, concentrations exceeded those found in on-site surface soils.

Fish were collected from Little Valley Creek and analyzed for tissue-bound PCBs. The maximum PCB concentration, species, sample type, and location for each year that samples were collected is listed in Table 5.

Table 5. Maximum Concentration (ppm) of Tissue-Bound PCB in Fish

Date	Species	Sample	Location	Concentration
12/13/79	white sucker	6 whole fish	Mill Rd	6.66
3/11/80	white sucker	6 fillets	Wilson Rd	1.00
3/11/80	brown trout	5 fillets	Wilson Rd	0.42
2/18/81	brown trout	4 fillets	Mill Rd	3.86
2/18/81	white sucker	3 whole fish	Mill Rd	2.65
3/11/82	brown trout	4 fillets	Mill Rd	2.30
3/3/83	brown trout	4 whole fish	Mill Rd	5.28
3/28/85	brown trout	5 fillets	Wilson Rd	0.43
1/9/86	brown trout	6 whole fish	Mill Rd	4.50
1/9/86	brown trout	6 whole fish	Mill Rd	2.80

Tissue concentrations of PCBs in fish collected from tributaries of Little Valley Creek were extremely high. Fish taken along Mill Road contained higher concentrations of PCBs than fish taken along Wilson Road.

No complete characterization of on- or off-site contaminants has been conducted at the Paoli site. No comprehensive groundwater or surface water sampling of tributary streams has been performed. Surface water and sediment samples indicate that such monitoring should be implemented.

It appears that off-site transport occurs through erosion and groundwater discharge into the two tributary streams of the Schuylkill; the contaminant plume could travel over six kilometers to reach the Schuylkill.

In severely contaminated waters, PCBs can be gradually released from the sediments over a long period of time at toxic levels.[7] Juvenile organisms also appear more susceptible to the effects of PCBs than are either eggs or adults.[6]

SITE ACTIONS

Response Category

State Enforcement Lead
Federal Fund Lead
Federal Enforcement Lead

State Fund Lead
Federal Facility

CONTACTS

NOAA Reviewer

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EPA Contacts

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Legal:	Steve Miano	(215) 597-8542

Co-Trustee Contacts

DOI:	Cindy Rice, USFWS	(814) 234-4090
State:	Marilyn Schup, PADER	(215) 270-1975

REFERENCES

1. Hazard Ranking System Documentation Records and reference package (containing U.S.EPA file information). 1986. Philadelphia: U.S. Environmental Protection Agency Remedial Response.
2. Pavia, Robert, et al. 1985. Coastal Hazardous Waste Site Review: Tysons Dump, Upper Merion Township, Pennsylvania, June 30, 1985. Seattle: Ocean Assessments Division, National Oceanic and Atmospheric Administration.
3. Koffman, Mike, Fishery Biologist, Pennsylvania Fish Commission, Anadromous Fish Program, Philadelphia, personal communication, April, 1987.
4. Beccassio, A.D., et al. 1980. Atlantic Coast Ecological Inventory: User's Guide and Information Base. OBS/FWS-80/51. Washington D.C.: U.S. Fish and Wildlife Service. 163 pp. plus maps.
5. U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Polychlorinated Biphenyls. Federal Register. Washington, D.C.: U.S. Government Printing Office.
6. Clement Associates, Inc. 1985. Chemical, Physical and Biological Properties of Compounds at Hazardous Waste Sites. U.S. Environmental Protection Agency.
7. Versar, Inc. 1981. Water-Related Environmental Fate of 129 Priority Pollutants, Volume I: Introduction and Technical Background, Metals and Inorganics, Pesticides, and PCBs. Washington, D.C.: U.S. Environmental Protection Agency.